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Internet of Things based Infra-Red Temperature Data Gathering system using Contactless Approach

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Abstract. Since the corona outbreak, it has been difficult to identify individuals who were infected with the virus. This issue can be solved by using temperature devices that can detect body temperature. Currently, there are no temperature guns that can give the authorities a warning or alert when the temperature exceeds a certain threshold. In this article, we will present an Internet of things temperature management system. This project will introduce an interface that will allow the sending of email notifications if the temperature of a specific individual exceeds a certain threshold. The Internet of Things is transforming our lives by enabling us to control and monitor various systems remotely. For this project, we will build a temperature monitoring device that will be able to send email notifications. In this project, we will harness the potential of IoT to create a Temperature Monitoring gadget with email notifications using the Raspberry Pi, MLX90614, and PiCamera.

Keywords: Temperature Monitoring system, Infrared approach, Internet of Things, Email

INTRODUCTION

The Internet of Things (IoT) is expected to have a profound impact on the healthcare industry. IoT is the network of physical devices, vehicles, buildings, and other items embedded with electronics, software, sensors, and network connectivity that enables objects to exchange data and information. Medical IoT is a subset of IoT that connects medical devices and equipment, such as implanted medical devices, diagnostic equipment, and health monitors, to the internet. The medical IoT is designed to improve patient care, reduce costs, and improve the quality of life for patients [1].

The Internet of Things (IoT) is starting to have a big impact on our lives. The most obvious examples are the technology we use every day: smartphones, tablets, smart watches, and smart home devices. But IoT is also making an enormous impact in the background, where we don't even realize it. IoT is making our homes smarter, our cars safer, and our lives healthier [2]. The ability for devices to communicate with each other and share data has yielded countless benefits. But the Internet of Things (IoT) can do even more when it's used in healthcare. The ability for wearable devices to communicate with apps on smartphones can help people manage their health. For example, a person's wearable fitness tracker can record their steps and then automatically send that data to their diet app to help them keep track of their diet and exercise [3].

With the current healthcare system being so heavily reliant on digital technologies, it's no wonder the IoT is becoming an integral part of the healthcare ecosystem. The IoT can be applied in a variety of healthcare contexts, from home health monitoring devices to advanced diagnostic equipment. Today, we're going to be discussing the ways in which IoT is being used in the healthcare industry to improve the quality of care and reduce costs [4]. The Corona virus 2019 epidemic, with over a thousand deaths in the United States and more than two hundred thousand around the world, has had severe and widespread repercussions. As the first major global health crisis since the

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emergence of COVID-19, it is affecting many aspects of education [5]. The outbreak has been a severe test of the ability of our educational systems and the people who work in them to adapt for many [6]. During the corona epidemic, it has been extremely difficult to determine whether a person is infected with the virus. Temperature gadgets are usually used to assess the temperature of the body to overcome this problem. These gadgets contain non-contact infrared temp sensor that can monitor body temp without even any human contact [7].

This system can forecast overheating of the electrical wire connection and the potential of all types of accidents, and it aids in the elimination of electrical wire interface dangers and offers an effective assurance for safe operation. This system employed a tiny and non-invasive IR monitoring system to eliminate the flaws of construction and maintenance trouble and high application costs [8]. A ferroelectric polymer-based temperature controller for micro fluidic devices is presented in this study. The sensor's integration into a system-on-a-chip platform enables rapid tracking of a biologic fluid's localized temperatures, minimizing inaccuracies in the assessment of the fluid's thermal development during research [9]. In the modern day, personalized mobile healthcare combined with various wearable technologies has become a key subject of study. A flexible, wearable, and disposable paper-based continual body temperature measurement sensor for timely treatment prediction and precise detection of body thermal diseases, such as COVID-19, is suggested in the present study [10]. Collecting actual information is necessary around human healthcare. This study describes a method for remotely monitoring body's temperature. The data was acquired from a team of volunteers while the device was being tested using sensors built by the study team [11]. This study describes the wirelessly measurement of body temperature using an Arduino microcontroller with several sensors and free software internet access [12].

METHODOLOGY

This project will create an infrastructure which will allow email messages to be sent whenever a particular person's temperature reaches a set threshold. The Internet of Things is changing our lives by allowing us to remotely operate and monitor numerous pieces of equipment. For this research, we will create a temperature monitoring gadget capable of sending email notifications. In this project, we will use the Raspberry Pi, MLX90614, and Pi Camera to make a Temperature Monitoring device with email alerts as shown in Figure 1.

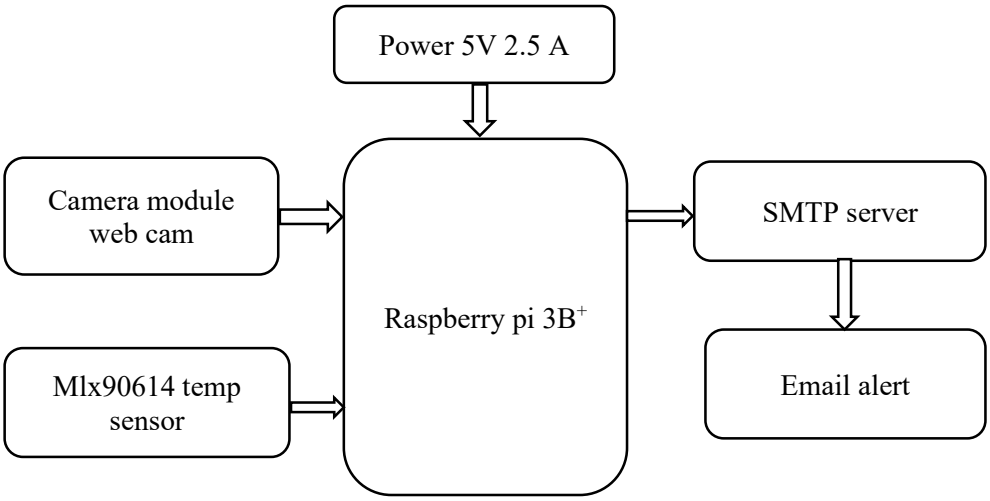

FIGURE 1. Proposed Model

Raspberry Pi is a series of single-board computers built primarily on the Raspberry Pi model 3B, a credit card-sized computer. These computers are used for a variety of purposes, ranging from hobbyists experimenting with technology to programmers testing and developing software. The Raspberry Pi is often used in education, providing an inexpensive platform for experimenting with programming, computer science, and other technical fields. The Raspberry Pi was originally designed as an educational tool to help children learn how to program and

how computers work, but it has since been used for a variety of purposes. The Raspberry Pi camera module is a small form-factor camera with a resolution of 640x480 pixels. It includes a CCD and supports common image formats like PNG and JPEG. The Raspberry Pi camera module is a great way to add camera functionality to your Raspberry Pi project, but it also has plenty of other uses. For example, you can use the module to capture 360-degree panoramic images, which are useful for building things like virtual reality headsets. In this project we used a camera module to get the image of the person and give an alert to the authority via mail server [16].

In this system we're going to look at a very simple piece of technology, the infra-red (IR) temperature sensor. You might not have heard of it before, but the chances are you've probably used one without even knowing it. An IR sensor is a device that measures the temperature of something without making physical contact with it. They are frequently used for measuring the temperature of engines, or other parts of vehicles such as the gearbox, to ensure that they are operating within an acceptable range. This sensor is based on the Stefan-Boltzmann equation, which describes the power emitted by a black substance in terms of temperature. In layman's words, any item emits infrared radiation, and the intensity of that energy is precisely proportional to the object's temperature. The MLX90614 sensor turns the computed value into a 17-bit ADC, which is accessible via the I2C communication system.

RESULTS AND DISCUSSION

The Internet of Things is the networked world in which everyday objects have connectivity and data is shared between them [13]. This connectivity allows objects to collect data and transfer it to the internet, allowing for the collection and analysis of data that would have been impossible before the IoT arrived. One of the most exciting applications of the IoT is in the field of temperature monitoring [14]. The IoT has the potential to revolutionize the temperature monitoring industry by introducing a distributed temperature monitoring network that is both cheaper and more accurate than traditional remote sensing methods [15]. Figure 2 shows the implementation of the system.

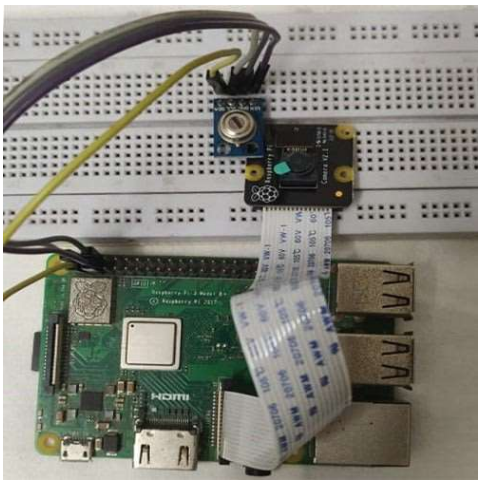

FIGURE 2. Hardware setup

One of the most exciting applications of the IoT in the field of temperature monitoring is in the field of healthcare. The IoT has the potential to revolutionize the temperature monitoring industry by introducing a distributed temperature monitoring network that is both cheaper and more accurate than traditional remote sensing methods. The use of IoT in the medical device industry is primarily focused on the field of temperature monitoring, which is especially important in the healthcare industry. Temperature is one of the most important factors in the management of a patient's condition, and it is critical that the temperature of a patient is monitored constantly. The python program performs all the activities required to receive the sensor data, compare it to the threshold value, authorize the email, and finally send the email with the image attached. First, we'll need libraries, as well as sender and recipient email declarations. Email may be sent using smtplib, but we just want the email to be organized with a topic, body, and additional attachments, which is accomplished using Multipurpose Internet Mail Extensions

(MIME). Figure 3 shows the reading of the temperature sensor. If the temperature of the person reaches the threshold range, our Python application will grab a picture from the cameras, save it on the Raspberry Pi, and send it through email. The following is an example of an email sent from a Raspberry Pi.

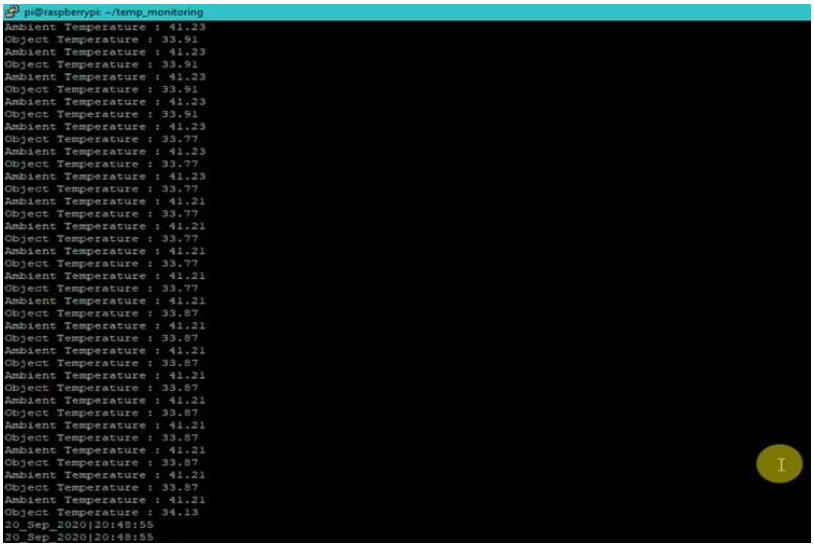

FIGURE 3. Temperature reading from infra-red sensor

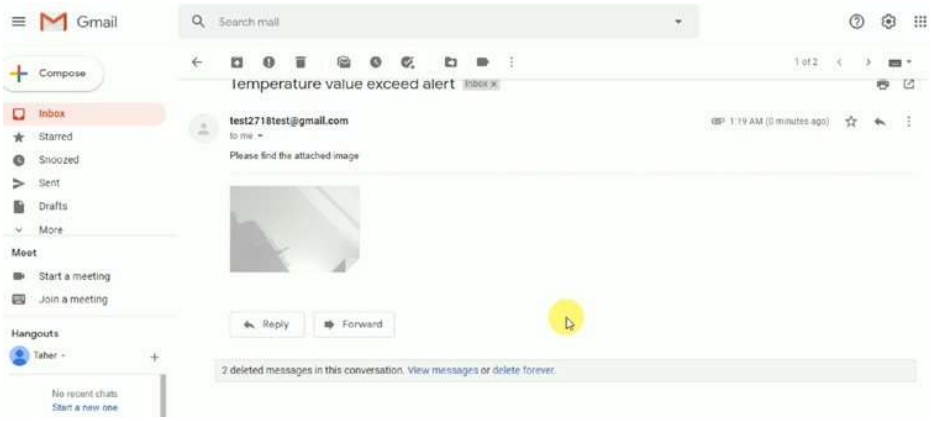

FIGURE 4. Email alert

Here we used SMTP mail server top alert the surroundings of the person with image who has high body temperature as shown in Figure 4.

CONCLUSIONS

The term "Internet of Things" (IOT) refers to all the gadgets that exist in the world and are linked to the Internet. The goal of IOT is to use the Internet to gather and share data between two devices. IoT has made remarkable development in recent years and has shown itself to be quite valuable in a variety of real-world applications. It is extremely beneficial in applications that require both network infrastructures. In this article, we will present an Internet - of - things temperature management system. This project will introduce an interface that will allow the sending of email notifications if the temperature of a specific individual exceeds a certain threshold. The Internet of

Things is transforming our lives by enabling us to control and monitor various systems remotely. For this project, we will build a temperature monitoring device that will be able to send email notifications. In this project, we will harness the potential of IoT to create a Temperature Monitoring gadget with email notifications using the Raspberry Pi, MLX90614, and Pi Camera.

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